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REMARKS

By this amendment, claim 1 has been amended. Claims 1-4 and 6-11 remain in the application. This application has been carefully considered in connection with the Examiner's Action to place the same in prima facie condition for allowance. Reconsideration, withdrawal of the final action, and allowance of the application, as amended, is respectfully requested.

Rejection under 35 U.S.C. § 103

Claim 1

Claim 1 recites an image processing method for providing three-dimensional geometric modeling of the spine, using a biplanar image reconstruction, comprising: acquiring a first digital view (F) of a part of the spine; acquiring a second digital view (L) of the same part of the spine taken from a different angle around the longitudinal axis of the spine; drawing an axial line (FAL, LAL) coinciding with a virtual axial line in a respective one of the first and second digital views, wherein drawing includes using a control means of a drawing program, and wherein each axial line (FAL, LAL) corresponds to a piece-wise linear curve drawn from a start point to an end point; matching the dimensions of the digital views (F, L) from two predetermined corresponding landmarks (P1, P2) on each view, wherein matching includes estimating a scale factor and a translation factor to make a system of coordinates for each view coincide, to provide a unique system of coordinates for the first and second digital views; performing a spline calculation to provide a smoothed axial line (FAC, LAC) on each digital view, the spline calculation including mathematical modeling of the drawn piece-wise linear curves of the first and second digital views for supplying respective new digital smoothed curves, the new digital smoothed curves being constructed with interpolated values provided between points of the respective piece-wise linear curves; and deriving three-dimensional coordinates (z, x, y) of corresponding points (P) along the spine as a function of the smoothed axial lines (FAC, LAC).

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Claims 1-4, 6 and 7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aubin et al., (hereinafter Aubin), "Morphometric evaluations of personalized 3D reconstructions and geometric models of the human spine" in view of Andre et al., (hereinafter Andre), " Approach of the smoothing of three-dimensional reconstructions of the human spine using dual Kriging interpolation".

With respect to claim 1, Applicant traverses this rejection on the grounds that these references are defective in establishing a prima facie case of obviousness with respect to claim 1.

As the PTO recognizes in MPEP § 2142:

... The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness...

It is submitted that, in the present case, the examiner has not factually supported a prima facie case of obviousness for at least the following, mutually exclusive, reasons.

1. Even When Combined, the References Do Not Teach the Claimed Subject Matter

The Aubin and Andre references cannot be applied to reject claim 1 under 35 U.S.C. § 103 which provides that:

A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ...
(Emphasis added)

Thus, when evaluating a claim for determining obviousness, all limitations of the

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claim must be evaluated. However, since neither Aubin nor Andre teaches drawing an axial line (FAL, LAL) coinciding with a *virtual* axial line in a respective one of the first and second digital views, wherein drawing includes using a control means of a drawing program, and wherein each axial line (FAL, LAL) corresponds to a piece-wise linear curve drawn from a start point to an end point as is claimed in claim 1, it is impossible to render the subject matter of claim 1 as a whole obvious, and the explicit terms of the statute cannot be met.

Thus, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

2. Prior Art That Teaches Away From the Claimed Invention Cannot be Used to Establish Obviousness

In the present case the Andre reference, by providing a 3-D reconstruction of a spine using six vertebral landmarks located at the center of end plates and tips of superior and inferior pedicles of each vertebra and wherein vertebral centroids are expressed as the average position of respective ones of the six landmarks, is directed to a system in which 3-D reconstruction of the spine represented as curves in space utilizes calculated control points for the vertebral centroids. Thus, this system clearly teaches away from claim 1, recited above.

Since it is well recognized that teaching away from the claimed invention is a *per se* demonstration of lack of *prima facie* obviousness, it is clear that the examiner has not borne the initial burden of factually supporting any *prima facie* conclusion of obviousness.

Thus, for this reason alone, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

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3. The references are not properly combinable if their intended function is destroyed

It is clear that the Aubin and Andre references are not properly combinable since, if combined, their intended function is destroyed. More particularly, if the Andre reference were used for matching the two views, as required by the rejection, it would be rendered inoperable for its intended purpose because it uses six landmarks per vertebra in contrast to the 21 landmarks per vertebra of Aubin (illustrated in Fig. 2 of Aubin), and the expression of vertebral centroids as an average position of the 21 landmarks per vertebra of Aubin would yield a significantly different 3-D reconstruction result.

Thus, since this modification of the Andre reference clearly destroys the purpose or function of the invention disclosed in the reference, one of ordinary skill in the art would not have found a reason to make the claimed modification.

Thus, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

4. The recognition of a problem, or of the source of the problem, is not obvious even though the solution to the problem may be obvious

In the present case, it is apparent from a reading of the Aubin reference and the Andre reference that neither recognized the problem of providing three-dimensional geometric modeling of the spine from a biplanar image reconstruction in an inexpensive and quick manner for usage by any radiologist, wherein only two standard 2-D digital views of the spine are needed and the 3-D image of the global spine axis is obtained by image processing techniques in response to the radiologist setting several landmarks on each of the 2-D digital views, and furthermore requiring no special skill in the field of drawing with computer means. Thus, this is a classic example of a solution to a problem being obvious only after recognition of the problem by the applicant and is part of the

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"subject matter as a whole" language of 35 USC § 103 which should always be considered in determining the obviousness of an invention under this statute.

Thus, for this independent reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

5. The Combination of References is Improper

Assuming, arguendo, that none of the above arguments for non-obviousness apply (which is clearly not the case based on the above), there is still another, mutually exclusive, and compelling reason why the Aubin and Andre references cannot be applied to reject claim 1 under 35 U.S.C. § 103.

§ 2142 of the MPEP also provides:

...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made..... The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.

Here, neither Aubin nor Andre teaches, or even suggests, the desirability of the combination since neither teaches drawing an axial line (FAL, LAL) coinciding with a virtual axial line in a respective one of the first and second digital views, wherein drawing includes using a control means of a drawing program, and wherein each axial line (FAL, LAL) corresponds to a piece-wise linear curve drawn from a start point to an end point; as specified above and as claimed in claim 1.

Thus, it is clear that neither patent provides any incentive or motivation supporting the desirability of the combination. Therefore, there is simply no basis in the art for combining the references to support a 35 U.S.C. § 103 rejection.

In this context, the MPEP further provides at § 2143.01:

The mere fact that references can be combined or modified does not

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render the resultant combination obvious unless the prior art also suggests the desirability of the combination.

In the above context, the courts have repeatedly held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.

In the present case it is clear that the examiner's combination arises solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in either reference for the combination as applied to claim 1. Therefore, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

With respect to claims 2-4, 6 and 7, this rejection is traversed for at least the reasons stated herein above with respect to claim 1. In addition, claims 2-4 depend from and add further limitation, in a patentable sense, to allowable claim 1. Accordingly, claims 2-4, 6 and 7 are believed allowable.

Claims 8-11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aubin et al., (hereinafter Aubin), "Morphometric evaluations of personalized 3D reconstructions and geometric models of the human spine" further in view of Andre et al., (hereinafter Andre), " Approach of the smoothing of three-dimensional reconstructions of the human spine using dual Kriging interpolation" and Steiger et al. (U.S. 5,483,960), hereafter Steiger.

With respect to claims 8-11, this rejection is traversed for at least the reasons stated herein above with respect to claim 1. In addition, claims 8-11 depend from and add further limitation, in a patentable sense, to allowable claim 1. Accordingly, claims 8-11 are believed allowable.

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It is clear from all of the foregoing that independent claim 1 is in condition for allowance. Dependent claims 2-4 and 6-11 depend from and further limit independent claim 1 and therefore are allowable as well.

The amendments herein are fully supported by the original specification and drawing, therefore, no new matter is introduced.

An early formal notice of allowance of claims 1-4 and 6-11 is requested.

Respectfully submitted,



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